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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/137.084	08/20/98	STUMBORG	M 79329

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MMC1/0927

EXAMINER

VU, H

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 09/27/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.
09/137,084

Applicant(s)

STUMBORG ET AL.

Examiner

HUNG VU

Group Art Unit
2811

☒ Responsive to communication(s) filed on Sep 13, 1999

☐ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) 1-23 is/are pending in the application.

Of the above, claim(s) 14-20 is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 1-13 and 21-23 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been
☐ received.

☐ received in Application No. (Series Code/Serial Number) _____.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). 2,3,6,8,9,12

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

— SEE OFFICE ACTION ON THE FOLLOWING PAGES —

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DETAILED ACTION

Election/Restriction

1. Applicant's election of Invention of Group I, Claims 1-13 and 21-23, in Paper No. 10 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).
2. Applicant's election without traverse of Group I, Claims 1-13 and 21-23, in Paper No. 10 is acknowledged.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371© of this title before the invention thereof by the applicant for patent.

Claim 23 is rejected under 35 U.S.C. 102(a) as being anticipated by Hung et al. (PN 5,677,572).

Hung et al. discloses a semiconductor device comprising,
a substrate (11);

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a barrier film (13a) comprising barium atoms having a thickness less than 100Å on the substrate;

a material (13b) on the barrier film. Note Figure 1 of Hung et al..

4. Claim 22 is rejected under 35 U.S.C. 102(a) as being anticipated by Farnworth et al. (PN 5,962,921).

Farnworth et al. discloses a semiconductor device comprising,

a substrate material (30);

a barrier film (34) comprising elemental barium atoms on the substrate;

a material (12) on the barrier film. Note Figures 3-3C of Farnworth et al.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hung et al. (PN 5,677,572).

Hung et al. discloses a semiconductor device comprising,

a substrate (11);

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a barrier film (13a) comprising barium atoms having a thickness less than 100\AA on the substrate;

a material (13b) on the barrier film. Note Figure 1 of Hung et al..

Hung et al. does not clearly disclose the barrier film is a monolayer. However, in column 3, lines 3-6, Hung et al. discloses the thickness of the barrier film is between 0.3 to 5.0 nm. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to consider the barrier film of Hung et al. as a monolayer.

6. Claims 1-13 and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Farnworth et al. (PN 5,962,921) or Tsukamoto et al. (PN 5,285,079) in view of Hung et al. (PN 5,677,572).

Farnworth et al. discloses a semiconductor device comprising,

a substrate material (30) having a surface;

a barrier film (34) on the substrate surface, the barrier film having a layer comprising elemental barium atoms attached to the surface;

a conductor (12) on the barrier film, wherein barrier film inhibits diffusion of the conductor into the substrate;

wherein the barrier film is a single layer;

wherein the barrier film comprises a plurality of layers;

wherein the substrate material is a silicon semiconductor;

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wherein the substrate material is an insulating material. Note Figures 3-3C of Farnworth et al..

Tsukamoto et al. discloses a semiconductor device comprising,

a substrate material (101) having a surface;

a barrier film on the substrate surface, the barrier film having a layer comprising elemental barium atoms attached to the surface;

a conductor (106) on the barrier film, wherein barrier film inhibits diffusion of the conductor into the substrate. Note Figure 1 of Tsukamoto et al..

Farnworth et al. or Tsukamoto et al. does not disclose the barrier film is a monolayer. However, Hung et al. discloses a semiconductor device comprising a monolayer of barrier film. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the barrier film of Farnworth et al.'s or Tsukamoto et al.'s as a monolayer, such as taught by Hung et al. in order to reduce the work function between the semiconductor substrate and a metal electrode.

Although Farnworth et al. or Tsukamoto et al. and Hung et al. do not clearly disclose a conductor having a tendency to diffuse into the substrate material if in direct contact, however, it is well-known in the semiconductor art that metal conductor has tendency to diffuse into a substrate.

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With regard to claims 11-13, Farnworth et al. or Tsukamoto et al. and Hung et al. disclose all of the claimed limitations except the conductor comprising copper and the substrate comprising silicon oxide. Although Farnworth et al. or Tsukamoto et al. and Hung et al. do not teach the exact the material as that claimed by Applicant, however, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the structure having the materials as claimed, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Conclusion

7. Papers related to this application may be submitted to Technology Center (TC) 2800 by facsimile transmission. Papers should be faxed to TC 2800 via the TC 2800 Fax center located in Crystal Plaza 4, room 4-C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The Group 2811 Fax Center number is (703) 308-7722 and 308-7724. The Group 2811 Fax Center is to be used only for papers related to Group 2811 applications.

Any inquiry concerning this communication or any earlier communication from the Examiner should be directed to ***Hung Vu*** whose telephone number is (703) 308-4079. The

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Examiner is in the Office generally between the hours of 7:30 AM to 4:00 PM (Eastern Standard Time) Monday through Friday.

Any inquiry of a general nature or relating to the status of this application should be directed to the **Technology Center Receptionists** whose telephone number is (703) 308-0956.

Vu

September 23, 2000

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STEVEN LOHE